

IN THE ABSTRACT:

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ABSTRACT OF THE DISCLOSURE

A radiation-heated fluidized-bed reactor and a process for producing high-purity polycrystalline silicon by using this reactor are provided. In this reactor, a heater device (14) is a radiation source for thermal radiation which is arranged outside the inner reactor tube and as a cylinder around the heater zone, without being in direct contact with the inner reactor tube. The inner reactor tube is designed in such a manner that it uses thermal radiation to heat the silicon particles in the heating zone to a temperature which is such that the reaction temperature is established in the reaction zone.